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NASA TECH BRIEF



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High Expansion Coefficient Glasses Can be Sealed to Common Metals

A new series of high expansion coefficient glasses can be sealed by fusion onto the hot surface of metals and alloys. Glass-to-metal seals are used extensively in the electronic and electrical industries. The kinds of metals involved vary from the low expansion coefficient alloys such as kovar (iron-nickel-cobalt), cold rolled steels and nickel, to the high expansion coeffi-

Notes:

1. The following documentation may be obtained from:

National Technical Information Service
Springfield, Virginia 22151
Single document price \$3.00
(or microfiche \$0.60)

Sample Glasses, Their Sag Points and Expansion Coefficients
Composition (Wt %)

Glass Sample No.	SiO ₂	Na ₂ O	Al ₂ O ₃	K ₂ O	MgO	CaO	TiO ₂	BaO	NaF	Sag Point °C	Expansion Coefficient x 10 ⁶ (inch/inch/°C)
53	39.6	11.6	18.4	---	---	18.4	6.9	---	5.1	593	11.1
54	37.3	11.8	22.4	---	---	14.0	4.7	4.7	5.1	602	9.4
6	64.8	9.6	9.4	13.1	3.1	---	---	---	---	530	13.1

Notes:

1. Sag Point is the temperature at which glass begins to soften or flow.
2. An example of an application for the sample 6 composition is to seal the ends of a conventional electrical heating element where the high-expansion coefficient and good electrical and chemical properties of this glass are a distinct advantage.

cient metals such as copper, stainless steel, and aluminum.

The glasses developed have relatively low working temperatures and good chemical durability, and can be used in electrical insulators and feedthroughs to fluid or vacuum systems. Other applications include oxidation resistant or protective coatings on certain metal alloys for high temperature applications. Some representative samples of these glasses and certain selected properties appear in Table 1.

Reference:

NASA-CR-72520 (N70-14570), Development and Evaluation of Controlled Viscosity Coatings for Superalloys

2. Technical questions may be directed to:
Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Reference: B70-10429

(continued overleaf)

Patent status:

No patent action is contemplated by NASA.

Source: C. Hirayama, F. E. Camp, and
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Westinghouse Electric Corp.
under contract to
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